



**Project Name:** ME-NH Connections Study

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**Subject:** Analysis/Design Criteria

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### **Purpose**

The HNTB Study Team was selected by the Maine Department of Transportation (MaineDOT) and New Hampshire Department of Transportation (NHDOT) to conduct a transportation needs study (ME-NH Connections Study) between the City of Portsmouth, New Hampshire and the Town of Kittery, Maine over the Piscataqua River. The purpose of this memorandum is to document the methodologies and procedures used to determine the design condition to be evaluated for traffic operations analysis purposes.

### **Methodology**

The MaineDOT and NHDOT use Design Hourly Volumes (DHV) for planning and design purposes on transportation projects. The DHV typically represents a 30<sup>th</sup> highest hour of the year. “For the State of Maine, the DHV or 30<sup>th</sup> highest hour is typically a PM peak hour found during the summer months of July or August.”<sup>1</sup>

For this study, it was determined that the design hour should be a function of the peak demand for the combined volumes on the Sarah Mildred Long and Portsmouth Memorial Bridges. A

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<sup>1</sup> Administrative Guide to Metropolitan Planning Organizations, MaineDOT, December 2009.

review of available historical data for the bridges indicates that the hourly volumes are highly influenced by travel to/from the Portsmouth Naval Shipyard, as well as recreational traffic and the businesses in downtown Portsmouth and Kittery. As a result, the travel demands on the local bridges are not consistent with typical travel demand patterns and experience an earlier than normal weekday evening commuter peak hour. According to the April 2009 data collected for this study, the combined weekday peak hour volume of the two bridges occurs from 3:45 to 4:45 PM, which was selected as the system-wide peak hour for the study area.

As stated above, the travel demand patterns on the Sarah Mildred Long and Portsmouth Memorial Bridges are unique and not representative of typical travel demand patterns on other major roadways in the area. In addition, there are no permanent count stations on either bridge or in the immediate vicinity of the bridges to assist in the determination of the 30<sup>th</sup> highest hour. Therefore, it was determined that applying standard MaineDOT adjustment factors to estimate the DHV would not be appropriate for this study. However, it was determined that seasonally adjusting the April 2009 data to represent peak summer conditions would be consistent with MaineDOT standard procedures and that the seasonally adjusted volume would (for planning purposes) approximate DHV. The June 19, 2009 Technical Memorandum prepared by HNTB summarizes the methodology and assumptions used to develop the seasonal adjustment factors. The seasonal adjustment evaluation recommended an adjustment factor of 13% for the weekday AM and 12% for the weekday PM conditions to adjust the April 2009 to reflect summer conditions.

A limited data collection program was conducted in July 2009 in order to validate the adjustment factors applied to the April 2009 data. In reviewing this data it was important to note that between April and July 2009 the Sarah Mildred Long Bridge was down-posted to a 20-ton weight limit. Therefore, the July data was slightly increased to assume inclusion of heavy vehicles for an “apple to apples” comparison with the April data. Overall, the summer peak hour volumes on the Portsmouth Memorial Bridge were estimated to be approximately 15% higher than the April volumes. However, the summer peak hour volumes on the Sarah Mildred Long Bridge were actually lower than the volumes observed in April. The combined July peak hour volume of the two bridges was estimated to be approximately 4% higher than the combined April volume, which is less than the 12% seasonal adjustment factor.

### **Other Considerations**

In addition to the system-wide peak hour (3:45 to 4:45 PM), traffic volume networks for the individual peak hour conditions at each of the study area intersections and the bridges were also established for the weekday AM and PM peak hours. The April 2009 individual peak hour volumes were seasonally adjusted using the above noted factors to reflect summer peak hour conditions. Supporting traffic operational analyses were also performed for these analysis conditions such that critical (worst case) conditions outside of the system peak hour could be identified and monitored throughout the evaluation of alternatives if necessary.

### **Conclusions**

Review of the current and historical data available for the Sarah Mildred Long and Portsmouth Memorial Bridges indicates that peak travel demand patterns on the bridges are heavily based upon shift changes at the Portsmouth Naval Shipyard, as well as recreational traffic and businesses in downtown Portsmouth and Kittery. The unique patterns observed on the local bridges are not consistent with typical commuting patterns in the area. In addition, there are no permanent count stations on or in the immediate vicinity of the bridges. Therefore, it was determined that the use of standard factors to estimate DHV or 30<sup>th</sup> highest hour volumes would not be appropriate for this particular study.

In keeping with the premise that the 30<sup>th</sup> highest hour in Maine is most commonly consistent with a weekday PM peak hour in July or August, the April 2009 data collected for the study was seasonally adjusted to reflect a summer weekday PM peak hour condition. Seasonal adjustment factors were developed using the historical summer data available for the two bridges. The seasonally adjusted volumes are assumed to approximate the DHV or 30<sup>th</sup> highest hour volume for the Sarah Mildred Long and Portsmouth Memorial Bridges. Supplemental traffic data collected in July 2009 indicate that the seasonally adjustment factor applied to the April 2009 system-wide peak hour to estimate a summer condition is conservative, but falls within 10% of the total volume observed on both bridges.